


PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference RP/PCT/01-15		FOR FURTHER ACTION See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)	
International application No. PCT/BE01/00174	International filing date (day/month/year) 08/10/2001	Priority date (day/month/year) 08/10/2001	
International Patent Classification (IPC) or national classification and IPC C04B28/34			
Applicant A MOHAMMED, Pakiza			
<p>1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.</p> <p>2. This REPORT consists of a total of 5 sheets, including this cover sheet.</p> <p><input checked="" type="checkbox"/> This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).</p> <p>These annexes consist of a total of 4 sheets.</p>			
<p>3. This report contains indications relating to the following items:</p> <ul style="list-style-type: none"> I <input checked="" type="checkbox"/> Basis of the report II <input type="checkbox"/> Priority III <input type="checkbox"/> Non-establishment of opinion with regard to novelty, inventive step and industrial applicability IV <input type="checkbox"/> Lack of unity of invention V <input checked="" type="checkbox"/> Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement VI <input type="checkbox"/> Certain documents cited VII <input type="checkbox"/> Certain defects in the international application VIII <input type="checkbox"/> Certain observations on the international application 			
Date of submission of the demand 19/04/2003		Date of completion of this report 30.06.2003	
Name and mailing address of the international preliminary examining authority:  European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465		Authorized officer Mayne, J Telephone No. +49 89 2399 8572	



INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/BE01/00174

I. Basis of the report

1. With regard to the **elements** of the international application (*Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17)*):

Description, pages:

1-9 as originally filed

Claims, No.:

1-22 as received on 12/06/2003 with letter of 06/06/2003

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

- ☐ the description, pages:
- ☐ the claims, Nos.:
- ☐ the drawings, sheets:

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

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(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)

6. Additional observations, if necessary:

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes:	Claims	1-22
	No:	Claims	
Inventive step (IS)	Yes:	Claims	1-22
	No:	Claims	
Industrial applicability (IA)	Yes:	Claims	1-22
	No:	Claims	

2. Citations and explanations
see separate sheet

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT - SEPARATE SHEET**

International application No. PCT/BE01/00174

Re Item V

Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

Reference is made to the following documents:

D1: US-A-4 504 555

D2: US-A-3 179 527

D1 (col. 5-7) discloses an inorganic resin formed by reacting 2 liquid components A and B.

Component A contains either mono aluminium phosphate or mono magnesium phosphate and is preferably a clear aqueous solution.

Component A of examples 4 and 14 contains mono aluminium phosphate.

Component B contains a phosphate-reactive constituent which can be wollastonite, i.e. calcium silicate.

Component B of examples 4 and 14 contains wollastonite in a solution of trisodium phosphate.

SiO₂ is also present in component A of examples 4 and 14. D1 (col. 5, l. 39-54) makes it clear that SiO₂ is present as a filler which is not solubilized.

The process of claims 8-22 and the kit of independent claim 7 are therefore novel.

Since the SiO₂ of D1 is not solubilized it is not available for participating in the formation of the phosphate bonds. The calcium silicate sites of D1 are bound with aluminium phosphate bonds.

The products of claims 1-6 are therefore novel.

D2 discloses forming a coating composition by adding wollastonite and silica to an aqueous aluminium phosphate solution (see examples). There is no disclosure of the silica being solubilized. The silica is present in the solution in particulate form (col. 2, l. 13-27).

Claims 1-22 are therefore novel.

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT - SEPARATE SHEET**

International application No. PCT/BE01/00174

The Applicant has provided a novel type of phosphate binder and a novel method for producing it. According to the examples (p. 7) the binder is hardened very rapidly, within 10 minutes, after addition of the calcium silicate particles.

This was not foreseeable from the prior art. The formulations of D2 are said to be shelf stable. In example 4 of D1 the modulus of rupture has been measured after 2 hours and 4 days.

Claims 1-22 fulfill the requirements of Article 33(3) PCT.

Article 6 PCT

It has not been specified in claims 1 and 8 whether the ratio of $\text{Al}_2\text{O}_3/\text{SiO}_2$ is a mole or weight ratio.

The description (p. 2, l. 8) refers to the calcium silicate sites as preferably acting as cross-linking sites for alumina-silica phosphate bonds. Since this feature is in claim 1 is not merely preferable but compulsory.

The ratio range of $\text{Al}_2\text{O}_3/\text{SiO}_2$ of 0.3:1 to 10:1 is described in the description as advantageous (p. 3, l. 20). However, this feature is in claim 1 and independent claim 8 and is therefore also compulsory.

Amended claim 2 for replacement of claim 2 of the set of amended claims filed
with the preliminary examination request

2. The binder of claim 1, in which the alumina-silica phosphate bonds are bonds prepared from a mixture of water insoluble calcium silicate particles with an acid alumina-silica phosphate solution comprising solubilized SiO_2 and having a pH less than 2, said alumina-silica phosphate solution having a ratio $\text{Al}_2\text{O}_3/\text{SiO}_2$ ranging from 0.3 :1 and 10 :1, whereby the weight ratio water insoluble calcium silicate particles/solubilized SiO_2 present in the alumina-silica phosphate solution is greater than 1, preferably greater than 1.5.

AMENDED CLAIMS

1. An inorganic binder having calcium silicate sites which are connected the one with the other by alumina-silica phosphate bonds, the calcium silicate sites acting as cross-linking sites for the alumina-silica phosphate bonds with a ratio $\text{Al}_2\text{O}_3/\text{SiO}_2$ ranging from 0.3 : 1 and 10 : 1, advantageously from 0.6 : 1 and 6 : 1.
2. ~~The binder of claim 1, in which the weight ratio calcium silicate site / SiO_2 present in the alumina-silica phosphate bonds is greater than 1, preferably greater than 1.5.~~
see new amended claim 2.
3. The binder of claim 1, in which the calcium silicate sites are calcium meta silicate sites having a substantially acicular nature with a length/diameter ratio from 2/1 to 50/1, advantageously from 3/1 to 20/1.
4. The binder of claim 3, in which the calcium meta silicate sites has an average length from 10 μm to 10mm, advantageously from 50 μm to 5 mm.
5. The binder of anyone of the claims 1 to 4, in which the weight ratio calcium silicate sites/alumina-silica phosphate bonds is comprised between 0.1 and 1.1, advantageously between 0.3 and 0.9, preferably between 0.4 and 0.7.
6. A product comprising at least a binder according to anyone of the claims 1 to 5 and at least one filler.
7. A kit for the preparation of inorganic binder composition according to anyone of the claims 1 to 5, said kit comprising :
 - a container of bag containing a water insoluble calcium silicate, and
 - one or more containers or bags containing compounds for preparing an acid alumina-silica phosphate solution or containing an alumina-silica phosphate solution, the pH of said solution measured at 20°C being less than 1.5, advantageously less than 1, preferably less than 0.5, in which the silica is solubilized .

8. A process for the preparation of a binder according to anyone of the claims 1 to 5, in which water insoluble calcium silicate particles are mixed with an acid alumina-silica phosphate solution at a temperature lower than 50°C, said acid alumina-silica phosphate solution comprising solubilized SiO₂ and having a pH less than 2, advantageously less than 1.5, preferably comprised between 0.5 and 1.5, said alumina-silica phosphate solution having a ratio Al₂O₃/SiO₂ ranging from 0.3 : 1 and 10 : 1, advantageously from 0.6 : 1 and 6 : 1.
9. The process of claim 8, in which the weight ratio water insoluble calcium silicate particles / solubilized SiO₂ present in the alumina-silica phosphate solution is greater than 1, preferably greater than 1.5.
10. The process of claim 8, in which the calcium silicate particles are calcium meta silicate particles having a substantially acicular nature with a length/diameter ratio from 2/1 to 50/1, advantageously from 3/1 to 20/1.
11. The process of claim 10, in which the calcium meta silicate particles have an average length from 10µm to 10mm, advantageously from 50µm to 5 mm.
12. The process of anyone of the claims 8 to 11, in which the calcium silicate particles act as cross-linking sites for alumina-silica phosphate bonds.
13. The process of anyone of the claims 8 to 12, in which the weight ratio calcium silicate particles/alumina-silica phosphate solution is comprised between 0.1 and 1.1, advantageously between 0.3 and 0.9, preferably between 0.4 and 0.7.
14. The process of anyone of the claims 8 to 13, in which a filler is mixed with the calcium silicate particles before being mixed with the acid alumina-silica phosphate solution and/or a filler is mixed to the mixture calcium silicate/alumina – silica phosphate solution, before its hardening.
15. The process of any one of the claims 8 to 14, in which the hardening of the binder is carried out at a temperature comprised between 0°C and 50°C.

16. The process of anyone of the claims 8 to 15, in which the binder is hardened under pressure.
17. The process of anyone of the claims 8 to 16, in which the water insoluble calcium silicate is a calcium meta silicate having a substantially acicular nature with a length/diameter ratio from 2/1 to 50/1, advantageously from 3/1 to 20/1.
18. The process of claim 17, in which the calcium meta silicate has an average length from 10 μ m to 10mm, advantageously from 50 μ m to 5 mm.
19. The process of anyone of the claims 8 to 18, in which the amount of calcium silicate added to the acid silica alumina phosphate solution is such that the weight ratio calcium silicate / SiO₂ present in the acid solution is comprised between 1 and 5, advantageously comprised between 1.5 and 3.5.
20. The process of claim 19, in which the amount of calcium silicate added to the acid silica alumina phosphate solution is such that the weight ratio calcium silicate / SiO₂ present in the acid solution is greater than 2.
21. The process of anyone of the claims 8 to 20, in which the acid silica alumina phosphate solution is prepared by mixing a silica and/or alumina mixture with an acid consisting substantially only of phosphoric acid, and by adding possibly to the formed acid solution further silica and/or alumina.
22. The process of claim 21, in which the silica used for the preparation of the acid silica alumina phosphate solution is precipitated silica.

Amended claim 2 for replacement of claim 2 of the set of amended claims filed
with the preliminary examination request

2. The binder of claim 1, in which the alumina-silica phosphate bonds are bonds prepared from a mixture of water insoluble calcium silicate particles with an acid alumina-silica phosphate solution comprising solubilized SiO_2 and having a pH less than 2, said alumina-silica phosphate solution having a ratio $\text{Al}_2\text{O}_3/\text{SiO}_2$ ranging from 0.3 :1 and 10 :1, whereby the weight ratio water insoluble calcium silicate particles/solubilized SiO_2 present in the alumina-silica phosphate solution is greater than 1, preferably greater than 1.5.